Date: User: Friday, 13/06/2008 10:46:42 AM

Julie Lecocq

Process Sheet

Customer

: CU-DAR001 Dart Helicopters Services

Job Number"

: 39855

Estimate Number

: 10559

P.O. Number

This Issue Prsht Rev.

Previous Run

First Issue

: NC

: 13/06/2008 S.O. No. :

: // : 39854

: CROSSTUBES Type

Part Number

Drawing Name

: D412664203 : D412-664-243 REV D

: HIGH AFT X-TUBE 412

Drawing Number Project Number

: N/A

Drawing Revision

Material

Due Date

: 20/06/2008

Qty:

1 Um:

Each

Written By Checked & Approved By

Comment

04.02.16

06-03-29

Reformat; Added D3189-1 K/DS Remove Coments on Pick List JLM

Est Rev:F Est Rev:G 06.12.08

per ECN 886 As per Rev D

EC JLM

Est Rev:H 07-04-30 Est Rev:I 08-06-12

add comment in seq. 21 DD verified

by:EC

Additional Product

Job Number:



Seq. #:

2.0

4.0

Machine Or Operation:

Description:

DOCUMENT CONTROL

DC 1.0

Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

D412664203TRN 3.0

Crosstube Turning Detail



Comment: Qty.:

1.0000 Each(s)/Unit Total: 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch 339683

BENDING MACHINE - SKIDTUBES



Comment: BENDING MACHINE

BENDING

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

5.0



Comment: DIMENSIONAL CHECK OF X-TUBES

DIMENSIONAL CABCK OF X-TUBES

Dart Aerospace Ltd

W/O:		WORK ORDER CH	ANGES				
DATE	STEP	PROCEDURE CHANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approva QC Inspector
				,			
*			\$.	•	•		
· [•]	4					-	
Part No		PAR #: Fault Category:	NCP: Vec	No. DO	, ,	Date	

Part No:	P	AR #: Fault Category:	NCR: Yes No DQA: Date:
· · · · · · · · · · · · · · · · · · ·			QA: N/C Closed: Date:

NCR:	士.	WORK ORDER NON-CONFORMANCE (NCR)						
		Description of NC	*Corrective Action Section B		Verification	Variety Aller		
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Approval Chief Eng	Approval QC Inspector
						. 1	, i	
	$\mathbf{x}_{0}^{T_{0}}$							
						**		
,		Service American				*		
			7 3	د ا	· **	W.		
			4.	V				
			<u> </u>				***	,

Friday, 13/06/2008 10:46:42 AM Date: User: Julie Lecocq **Process Sheet** Drawing Name: HIGH AFT X-TUBE 412 Customer: CU-DAR001 Dart Helicopters Services Job Number: 10 39855 Part Number: D412664203 Job Number: Machine Or Operation: Description: Seq. #: **CROSSTUBES RESOURCE 1 CROSSTUBES** 6.0 Comment: LANDING GEAR RESOURCE 1 1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551 2-Ream hole to finish size in tube as per Dwg D412-664-243using drill Jig DT8550 & DT8551.Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes. 3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243 HAND FINISHING1 7.0 Comment: HAND FINISHING RESOURCE #1 Chemical Conversion Coat as per QSI 005 4.1 INSPECT POWDER COAT/CHEMICAL CONVERSION 8.0 OWDER COAT/CHEMICAL CONVERSION Comment: INSPEC INSPECT WORK TO CURRENT STEP 9.0 QC5 Comment: INSPECT WORK TO CURRENT STEP OUTSIDE SERVICES -skids 10.0 Comment: Sub-Contracting OUTSIDE SERVICES Liquid Penetrant Inspection as per QSI 038Or C268/07/04() Issue P/O: 6689 LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order PACKAGING RESOURCE #1 11.0 Min. Comment: PACKAGING RESOURCE #1 Inspect for transit damage Ensure copy of NDT results attached to work order.

Dart Aerospace Ltd

W/O:			WC	RK ORDER CHANG	GES				· · · · · -	
DATE	STEP	PR	OCEDURE CHA	NGE	By Date Qty			Approval Chief Eng / Prod Mgr Approva QC Inspector		
		•								
Part No	:	PAR #:	Fault Cate	jory:	NCR: Y	es No	DQ.	A :	_ Date: _	
	_				Q.	A: N/C	Close	d:	_ Date: _	
NCR:			WORK ORDI	ER NON-CONFORM	IANCE (N	CR)				
DATE	STEP	Description of NC	Initial		ction B	0	Verific		Approval	Approval
		Section A	Chief Eng	Action Description Chief Eng		n & ate	Secti	on C	Chief Eng	QC Inspector
		·								

Date: Friday, 13/06/2008 10:46:42 AM User: Julie Lecocq **Process Sheet** Drawing Name: HIGH AFT X-TUBE 412 Customer: CU-DAR001 Dart Helicopters Services Job Number: 39855 Part Number: D412664203 Job Number: Sea. #: **Machine Or Operation:** Description: INSPECT WORK TO CURRENT STEP 12.0 QC5 Comment: Inspect for damage & ensure results are as per Dwg D412-664-203 SPRAY PAINTING 13.0 Comment: SPRAY PAINTING 1-Prime inside and outside crosstube as per QSI 005 4.2 TML 08 07 04 2-Paint outside crosstube with White Imron as per QSI 005 4.2 - W 08 INSPECT SPRAY PAINT QC14 14.0 Comment: Inspect Spray Paint Wrap in plastic bag to protect from scratches 07 D3595063570 RUBBER CUSHION 15.0 Total: __4.0000-Each(s) Comment: Qty.: 4.0000 Each(s)/Unit **Rubber Cushion** 08-07-09 Batch: D2856600 Abrasion Strip 16.0 Comment: Qty.: 1.7640 f(s) Total: 1.7640 f(s)/Unit Pick: Qty Part number Description Batch 2 D2856-600(Cut to 10.090") Abrasion Strip D28961 17.0 Total: Comment: Qty.: 1.0000 Each(s)/Unit 1.0000 Each(s) Pick: Qty Part number **Description Batch** Support <u>3347</u> 08-07-09 1 D2896-1 Chafing Shield 18.0 D31891 Comment: Qty.: Total: 2.0000 Each(s)/Unit 2.0000 Each(s) Pick: Qty Part number **Description Batch** Chafing Sheild 31884 0807 2 D3189-1

W/O: WORK ORDER CHANGES		
DATE STEP PROCEDURE CHANGE By Date Qu	y Approval Chief Eng / Prod Mgr	Approval QC Inspector
Part No: PAR #: Fault Category: NCR: Yes No DQA: _	Date:	
QA: N/C Closed:	Date:	
NCR: WORK ORDER NON-CONFORMANCE (NCR)		
DATE STEP Description of NC Corrective Action Section B Verification	n Approval	Approval
Section A Initial Action Description Sign & Section C Chief Eng Ch	Chief Eng	QC Inspector
and the second s		

Friday, 13/06/2008 10:46:42 AM Date: User: Julie Lecocq **Process Sheet** Drawing Name: HIGH AFT X-TUBE 412 Customer: CU-DAR001 Dart Helicopters Services Part Number: D412664203 Job Number: 39855 Job Number: Description: Seq. #: **Machine Or Operation:** Clamp(per MIL-DTL-8783C) MS2192028 19.0 4.0000 Each(s) Comment: Qty.: 4.0000 Each(s)/Unit Total: Pick: **Description Batch** Qty Part number Clamp 107502 4 MS21920-28 08 01 clamp(per MIL-DTL-8783C) MS2192030 20.0 Comment: Qty.: 2.0000 Each(s) 2.0000 Each(s)/Unit Total: clamp(per MIL-DTL-8783C) batch: 106 8/0 08-07-07 CROSSTUBES RESOURCE 1 CROSSTUBES 21.0 Comment: LANDING GEAR RESOURCE 1 Assemble as per Dwg D412-664-203 1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe 2-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs 08-0709 Batch: (07621 A/R 6398 Magnobond Expiry Date: 08 - 69 - 17 3-Install clamps as per Dwg D212-664-203 using installaition jig DT9024 with 0.010 thick brass shims on both chafing sheild (D3189-1). Torque clamps to 80-100 in lb. INSPECT WORK TO CURRENT STEP 22.0 QC5 Comment: INSPECT WORK TO CURRENT STEP PACKAGING RESOURCE #1 23.0 PACKAGING 1 Comment: PACKAGING RESOURCE #1 Pick Packing Kit

Dart Aerospace Ltd

W/O:		WORK ORDER C	WORK ORDER CHANGES				
DATE	STEP	PROCEDURE CHANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
Part No	:	PAR #: Fault Category:	NCR: Yes	No DQ	A:	Date:	1
			QA:	N/C Close	d:	Date:	

NCR:		CR:		WORK ORDER NON-CONFORMANCE (NCR)				WORK ORDER NON-CONFORMANCE (NCR)	
		Description of NC		Corrective Action Section E	}	Verification	A		
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Approval Chief Eng	Approval QC Inspector	

Friday, 13/06/2008 10:46:42 AM Date: User: Julie Lecocq **Process Sheet** Customer: CU-DAR001 Dart Helicopters Services Drawing Name: HIGH AFT X-TUBE 412 Job Number: 39855 Part Number: D412664203 Job Number: Seq. #: **Machine Or Operation:** Description: AN640A Bolt 24.0 Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s) Bolt 107376 Batch Bolt 25.0 AN641A Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s) Bolt Washer 26.0 Comment: Qty.: Total: 18.0000 Each(s)/Unit 18.0000 Each(s) Washer Batch: MS21042L6 Nut Comment: Qty.: Total: 6.0000 Each(s) Nut Batch 28.0 QC4 100% KITS FOR COMPLETENESS Comment: INSPECT **PACKAGING** PACKAGING RESOURCE #1 29.0 Comment: PACKAGING RESOURCE #1 Identify and pack for shipping as per PPP D412-664-203 ******Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date B39855 D412 664 203 Time & date of packaging: Location: PPP Rev:

Dart Ae	rospace l	Ltd						
W/O:			W	ORK ORDER CHANGE	S			
DATE	STEP	PRO	OCEDURE CHA	ANGE	Ву	Date Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
Part No	:	PAR #:	Fault Cate	egory:	NCR: Yes	No DQA:	Date: _	
					QA: N/	C Closed:	Date: _	
NCR:		V	VORK ORD	ER NON-CONFORMAI	NCE (NCR)		
DATE	OTED	Description of NC		Corrective Action Section		Verification	Approval	Approval
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Chief Eng	QC Inspector

	WORK ORDER NON-CONFORMANCE (NCR)		WORK ORDER NON-CONFORMANCE (NCR)				
	Description of NC		Corrective Action Section E	3	Varification	Annewal	Ammovol
STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	n & Section C	Chief Eng	Approval QC Inspecto
						·	
					,		
			7.14				
							,
							,
	STEP	STEP Description of NC	STEP Description of NC Section A Initial	STEP Description of NC Section A Initial Action Description	STEP Description of NC Section A Initial Action Description Sign &	STEP Description of NC Section A Initial Action Description Sign & Section C	STEP Description of NC Section A Proval Initial Action Description Sign & Section C Se

Date:

Friday, 13/06/2008 10:46:42 AM

User:

Julie Lecocq

Process Sheet

. Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39855

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description:

30.0

QC21

FINAL INSPECTION/W/O RELEASE

Comment: FINAL INSPECTION/W/O RELEASE

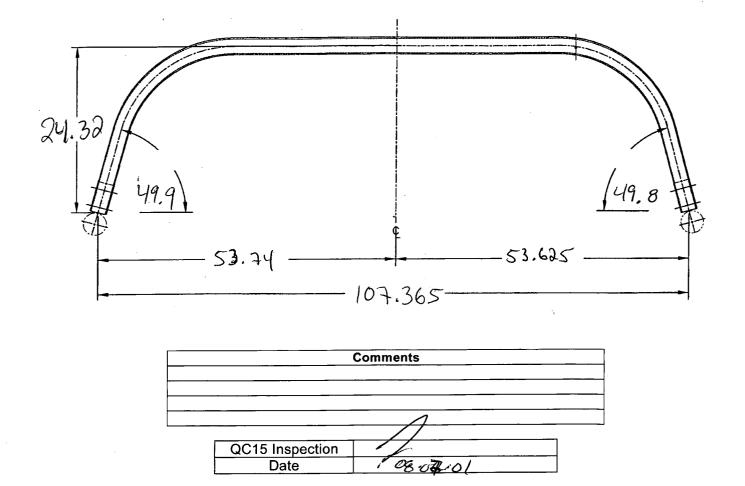
Job Completion



N/O:			W	ORK ORDER CHANGES					
DATE	STEP	PR	OCEDURE CH	ANGE	By Date			Approval Chief Eng / Prod Mgr	Approval QC inspector
Part No	:	PAR #:	Fault Cat	egory: N				Date:	
NCR:			WORK ORI	DER NON-CONFORMANO			u	Date	
				Corrective Action Section B		····			
		Description of NC		Corrective Action Section B		\/o=ifi			
DATE	STEP	Description of NC Section A	Initial Chief Eng	Action Description Chief Eng	Sign 8		cation ion C	Approval Chief Eng	Approval QC Inspector
DATE	STEP		1 1	Action Description					
DATE	STEP		1 1	Action Description					
DATE	STEP		1 1	Action Description					
DATE	STEP		1 1	Action Description					
DATE	STEP		1 1	Action Description					

DART AEROSPACE LTD	Work Order:	3935
Description: Crosstube High Aft (412)	Part Number:	D412-664-203
Inspection Dwg: D412-664-243 Rev: D		Page 1 of 1

Required Dimension	Min	Max
Height	24.24	24.50
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
В	07.05.08	Dimensions updated per Dwg rev. D	KJ/JLM X	fr
		<u> </u>		



DESIG	PH	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA					
CHEC	KED (C)	APPROVED ALL	DRAWING NO. REV. D					
L	47		D412-664-243 SHEET 1 OF 3					
DATE			TITLE SCALE					
07.0	03.09		CROSSTUBE ASSEMBLY (412 HI AFT) NTS					
Α		01.10.17	NEW ISSUE					
В		05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES					
С		06.10.27	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398 MS21920-32 WAS MS21920-30					

D3595-063-570

REMOVE D2732-058, CHANGE TO

Qty	Part Number	Description						
Х	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)						
1	D6009-129	CROSSTUBE						
2	D3595-063-570	RUBBER CUSHION						
1	D2896-1	SUPPORT						
2	D2856-600-1009	ABRASION STRIP						
4	MS21920-28	CLAMP						
2	MS21920-30	CLAMP (OR MS21920-32)						
2	D3189-1	CHAFING SHIELD						
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100 TYPE II, CLASS 2 ADHESIVE)						

07.03.09

GENERAL NOTES:

UNACCEPTABLE.

- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- MATERIAL: MANUFACTURED FROM D6009-129

FINISHED LENGTH = 124.09±0.020

D

- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2 PAINT OUTSIDE PER DART 005 4.2
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN-OFF PART. BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE
- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS
- INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE

OF CROSSTUBE PER QSI 035. 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE

BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE

ENGINEERING DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BEICONTROLLED COPY SUBJECT TO AMENDMENT

SHOP COPY

RETURN TO

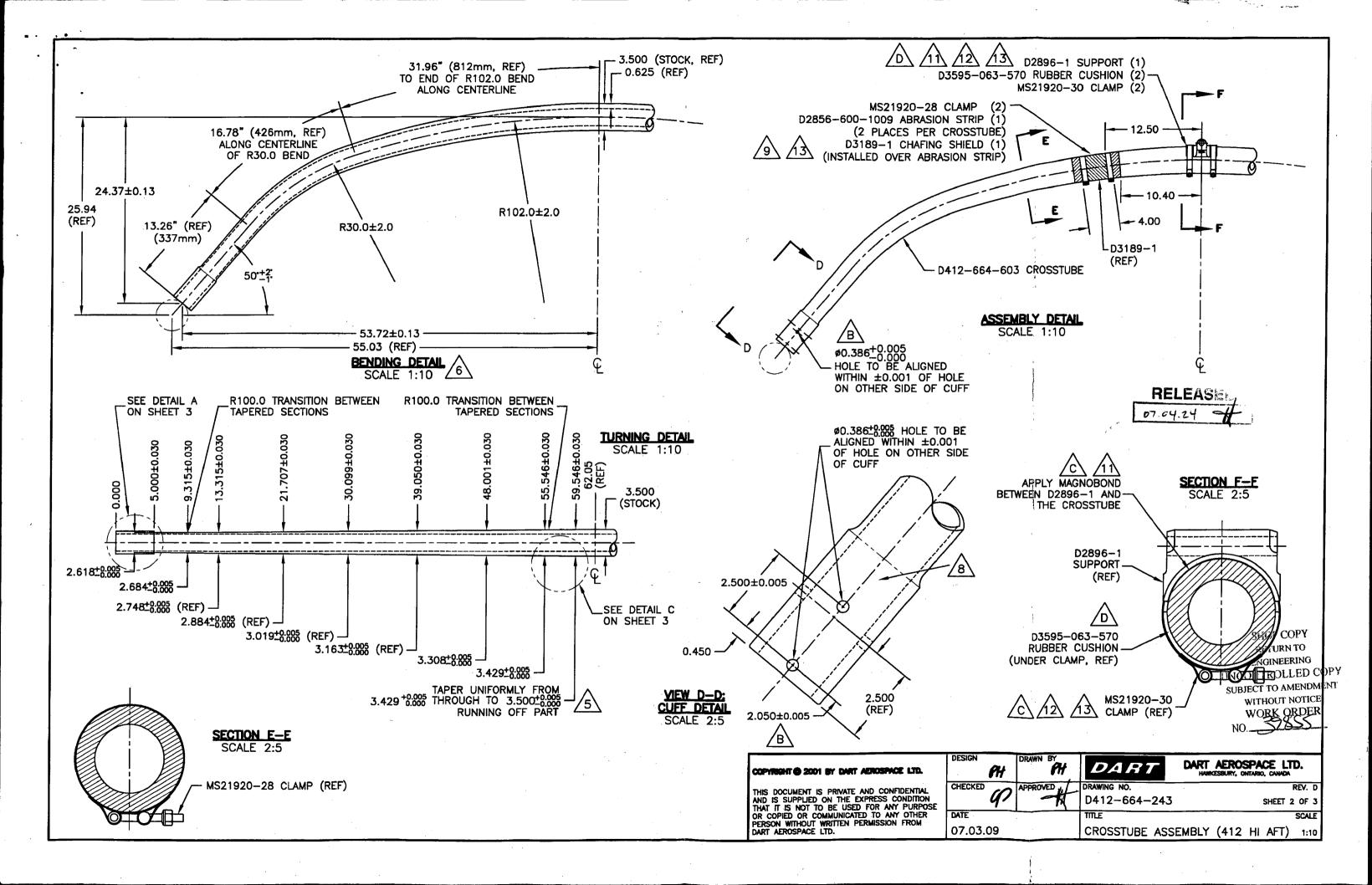
11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.

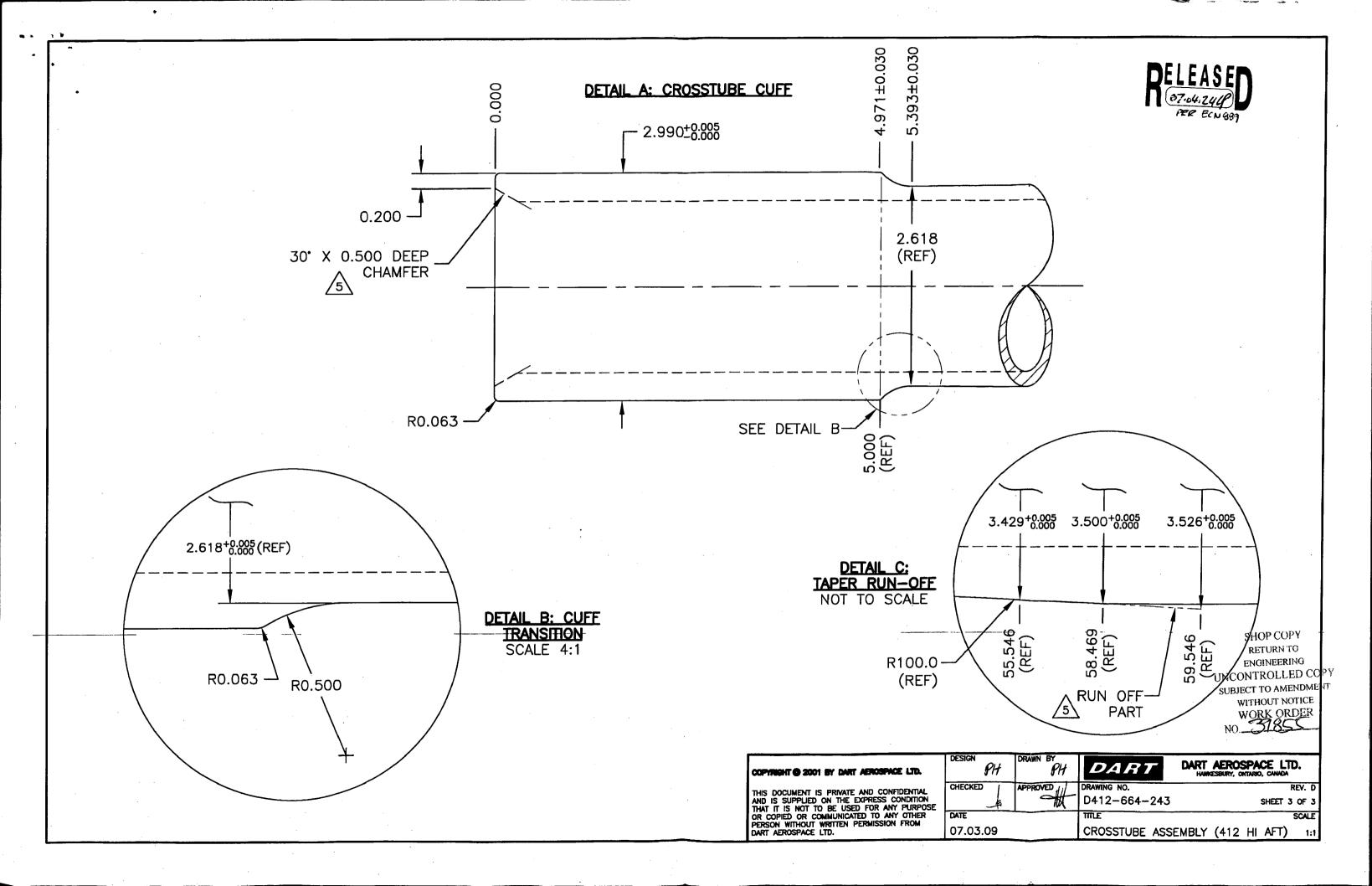
WITHOUT NOTICE WORK ORDER

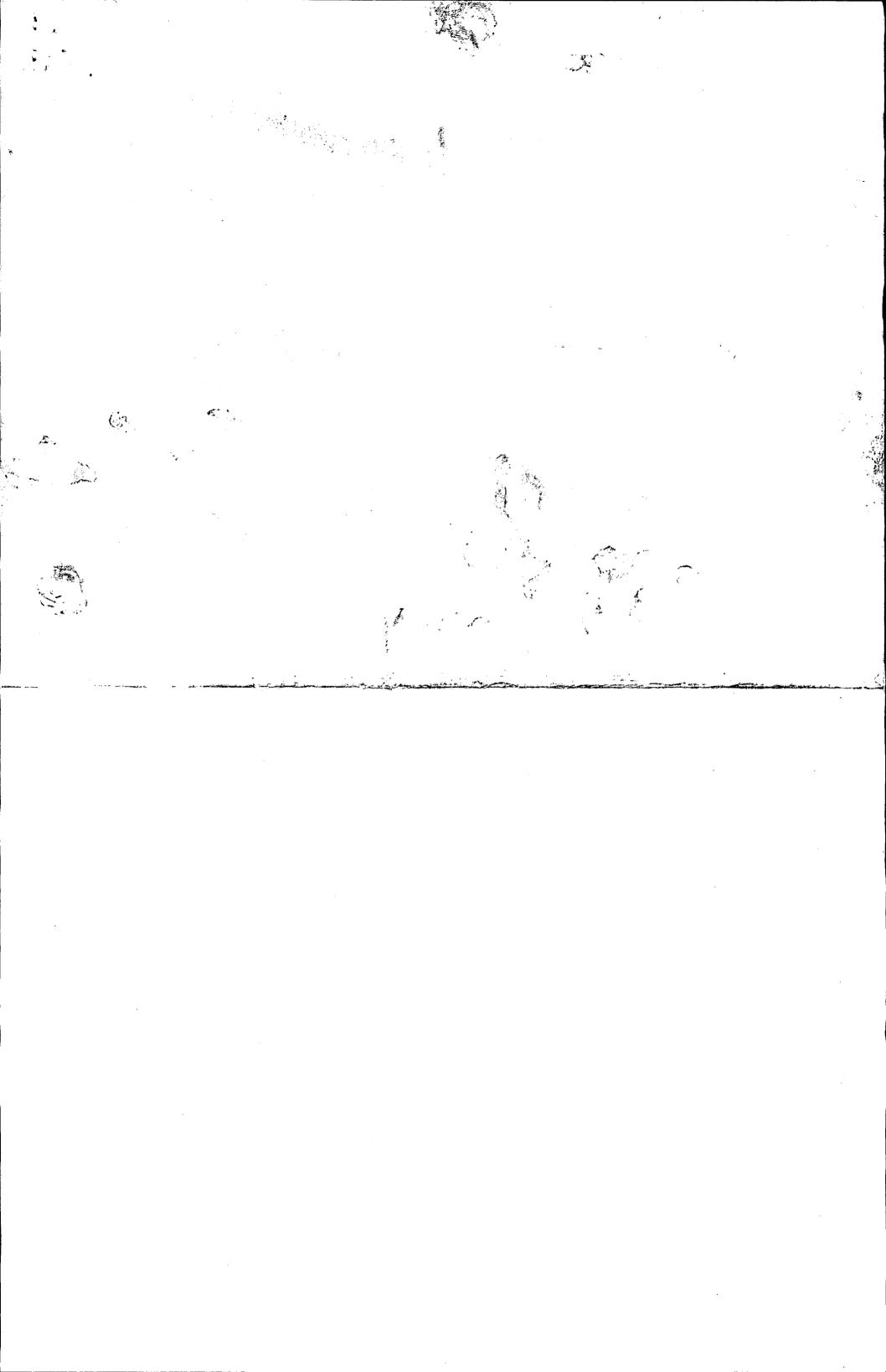
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

Copyright 2001 by DART AEROSPACE LTD

THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.







LIQUID PENETRANT TEST REPORT P.— 1380 1

	*	L_1	WOID I'L	-14	1041111-	01112. 4	/ 1 × 1	-		-	
ACUREN											
***					·	"" \ 2 30(PAGE	1	_ OF _1_	
CLIENT	DART AEROSPA				DATE	JULY 3, 200 188 08 1380		TIME	AM 🗆	PM	
ATTENTION .	LINDA LACELLE				_ ACUREN JOB NO.						
ADDRESS	1270 ABERDEE				PO/WO No.	GG80 HAWKESBU					
	HAWKESBURY,	, ONT.			WORK LOCATION	ASTM 1417			2005		
	***********	FED X TUBES, 407 F	TIN V TI IDEC	142 NIC	ACCEPTANCE STO	no.	/QSI-030	REV./DA	.πE		
PROJECT		FED X TUBES, 407 F 5, 39906, 39365, 393			#AFIX IUDEU	, <u>, .</u>					—
ITEM(S) EXAMINED	JOR#2 วลลดก	, 39906, 39300, 390	100, 3500-, 500	55.							
								75.			
JOB DESCRIPTION	N	PROCEDURE NO.	LT-0002 REV	v./Date		TECHNIQUE NO.	. LT-TECH2	REV./DA	TE		
PART No. D21266						ODINED ALUM.		HICKNESS _			
SCOPE WET	FLOURESCEN	T LIQUID PENET	RANT INSPE	CTION (CARRIED OUT	ON 100% EXT	FERNAL SUF	RFACE			
	·	•									
TEST DETAILS									- Por		
M ETHOD	FILIC	DRESCENT	☐ VISIBLE		☑ WATER WASH		SOLVENT REM	MOVABLE	☐ Pos Emulsi		
	MAGNAFLUX	RESCENT	- VIOIDE		BLACK LGHT8171	1 🗀	OUTPUT > 100	00 μ W/cm²	□ Амві	SIENT < 2 fo	
PENETRANTZL67		MINIMUM DWELL			LIGHTING EQUIP.			HT 🚨 Ovn	PUT>100 fc	:@ SURFA	(CE
PENETRANT REMOVE DEVELOPER S	ER H20 SKDS2	MINIMUM DRY TIN		Min. Min.	OTHER LIGHT METER S/N	CAL MAY 1 0	8	CAL DU	JE DATE		
DEVELOPER TYPE	Mon Aqu				LIOTT						_
TEST SURFACE								77. (BAS	- Ademai	
SURFACE CONDITION SURFACE TEMPERAT			As Welded - 4°C/20°F to 10		☐ MACHINED F	☐ SHOT BLA	ASTED °F TO 52°C/125		CLEAN BAR > 52°C/125		·
RESULTS-	(D METRIC		4 0/201 10	U 0,00 .			F 10 02 4				_
\\\\								-			-
FLUORE	ESCENT LIQUID PE	NETRANT INSPECTION	ON								
CARRIE	ED OUT ON 100% E	EXTERNAL									
SURFAC	CE ON:										
					•						
		BES JOB#S39905,3	9906		n		•			1881	
	VD X TUBE JOB#S 3				m	080	103				
(412)110	3H AFT X TUBE JOF	в#s 39854, 39855)		AlliC		•				
				•							
_ *.		·							*		
RESUL		ATION OF DEFEC						:			
	ITEMS ACCE	EPTABLE TO STA	NDARD								
						·				<u></u>	
Scope of Services The agreement of Acuren G	iroup Inc. to perform serv	vices extends only to those se	ervices provided for it	n writing. U	Inder no circumstances sh	hall such services exter	nd beyond the perfor	mance of the req	puested service	ss. It is expr	szz).
be construed as representati	tions or warranties. Acure	essions of opinion reflect the or ren Group Inc. is not assumit	ing any responsibilities	s of the owne.	er operator and the owner	er operator retains comp	uplete responsibility fo	for the engineerin	ug, manufachur	ided пот сын ге, гераіг апк	nne. d use
Standard of Care		provided by Acuren Group Inc nc. uses the degree, care and s								h- express	wi or
implied, is made or intended	by Acuren Group Inc.	. HSES THE GEGIEVE, CARE GIRLS	kill ordinarily excition	A tinger som.	lar circinusianos e, suc	rs perjorming own	ACES IN the sum-	amilia io	Work	<i>I</i> 110,	
SIGNATURES											
CLIENT REPRESENT	TATIVE	7 Points /			SIGNATURÉ		DTR#	<u> </u>			
TECHNICIAN (SIGNAT	TURE):	Hwill.	··		SIGNATURE		EPORT				
VAME (PRINT):		JASON HEWETT				KE	EVIEWED BY:	NAME		INITIALS	<u> </u>
VAME (FRIN).		1 ST TECHNICIAN			2 ND TECHNICIAN			IAVIAN-			•
	CGSB LEV	EVEL <u>2</u> SNT LE EG. NO 6156		CGSB LEVE		_EVEL					
	COODINE	3. NO 0130		CGSB REG	NO						1